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Title: Alien plant species in the flora of the Silesian Voivodship

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Citation style: Tokarska-Guzik Barbara. (2005). Alien plant species in the flora of the Silesian Voivodship. W: B. Tokarska-Guzik, G. Woźniak, B. Babczyńska-Sendek, E. Sierka, A. Urbisz (red.) ; R. Tertil, K. Brzózka, I. Harman (tł.) "Special characteristics of the Silesian Voivodship regions in focus : culture - landscape – wildlife : a guide to the field sessions" (S. 11-14). Katowice : Uniwersytet Śląski : Wydawnictwo Gnome



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Invasion of the Asiatic knotweeds (*Reynoutria* species) along the river valley

Alien plant species in the flora of the Silesian Voivodship

The transmission of organisms beyond their natural distribution range is one of the effects of human activity, important in terms of nature. Specific plant and animal species behave differently in new areas, where they have been introduced either intentionally or unintentionally. Some species are definitely unable to compete with local species and they occur only ephemerally (casual species), whilst others can compete so effectively that they establish permanently, or even replace the native species. At the end of the 20th century, the spread and establishment of alien flora and fauna became so serious that it is specified as one of the major threats to biological diversity.

The International Convention on Biological Diversity (Rio de Janeiro, 1992) laid down a special provision calling on signatory countries to fight alien invasive species⁹, posing a threat to native habitats, communities or species. These considerations have contributed to the increased interest in these issues by both scientists and practitioners dealing with nature conservation. In Polish literature, as early in the 1950-s, attention was being paid to the need for research dedicated to contemporary migration of plant species, also due to the practical

aspect, i.e. using them for controlling noxious weeds.

Lists of alien species and synthetic studies on specific regions which provide a basis for practical activities, contribute significantly to our knowledge of species invasion. In this respect, lists of invasive species have been drafted for many countries and regions. The list of alien species compiled for the Polish flora includes more than 1000 species. It can be presumed that this flora contains a total of over 450 species permanently established (naturalised), of which 336 species have been found in the Silesian Voivodship.

The regional list of invasive species includes at least several dozen species. In this group, a proportion of these species occur only within anthropogenic habitats (including 22 species classified as weeds and thus posing a threat to agricultural land), whilst the remaining species also enter semi-natural and natural habitats.

Forty species have been considered to be "threats" to the native flora and vegetation cover. Those among them which threaten the native flora mostly include small balsam *Impatiens parviflora*, an annual yellow-flower plant of South-Asian origin, permanently settled in fertile and moist deciduous woods and tree clumps; Indian balsam *I. glandulifera*, a plant larger than the aforementioned species, with different colour flowers (pink),

spreading along streams and rivers in the southern part of the region; and finally, the North-American species of goldenrods: Canadian goldenrod *Solidago canadensis* and early goldenrod *S. gigantea* (= *S. serotina*)



Small balsam *Impatiens parviflora*

found throughout the province, often in massive numbers, along rivers, on the fringes of towns, and within abandoned fields. In thickets along rivers there are plants of North-American origin: the frequently occurring



Indian balsam *Impatiens glandulifera*

confused Michaelmas-daisy *Aster novi-belgii*, a climber; wild cucumber *Echinocystis lobata* (at present it is one of the most easily and rapidly alien species, migrating along river valleys, truly deserving the name of "invasive plant"), Jerusalem artichoke *Helianthus tube-*



North American goldenrods (*Solidago* species)

rosus, which is also intentionally introduced by foresters, and the knotweeds *Reynoutria* (*Fallopia*) of East-Asian origin – Japanese knotweed *R. japonica*, giant knotweed *R. sachalinensis* and a hybrid: *R. x bohemica*.



Confused Michaelmas-daisy *Aster novi-belgii*

In view of nature conservation the most threatening aspect of the knotweed invasion is the fact that they eliminate not only particular species but also entire communities, e.g. osiers, from the banks of major rivers.



Wild cucumber *Echinocystis lobata*

Commonly occurring throughout the province are the tree species which have been imported from North America (e.g. as decorative or honey-producing plants) such as: box-elder (ash-leaved maple) *Acer negundo*. The latter species is one of the most com-



Jerusalem artichoke *Helianthus tuberosus*



Giant knotweed and Japanese knotweed



Flowering Japanese knotweed *Reynoutria japonica*



Box-elder *Acer negundo* colonising abandoned fields

monly found alien species in river valleys, in the region and throughout Poland (for example along the Warta river it was found in osiers and willow-poplar carrs; and just as frequently it spreads into abandoned fields). Other species of similar origin include red



Red oak *Quercus rubra*



Rum cherry *Padus (Prunus) serotina* in a pine forest



Black locust *Robinia pseudoacacia*

oak *Quercus rubra* and rum cherry *Padus (Prunus) serotina* as well as false-acacia (black locust) *Robinia pseudoacacia*. Both red oak and rum cherry have been introduced into forests (mainly pine forests) as an understorey, and they were also regularly planted along forest roads and under high-voltage power lines. Today they spread on their own, and this process is facilitated by the high production of seeds by specimens barely exceeding ten years of age. The species concerned are mostly recorded in managed forest stands with deliberately planted pine, where they can even form an evident understorey layer, completely choking the herbaceous vegetation. The black locust *Robinia pseudoacacia*, a honey-producing tree species which also provides very hard



Sosnowsky's hogweed *Heracleum sosnowskyi*



Giant hogweed *Heracleum mantegazzianum*

wood, is one of the most frequently recorded tree species of alien origin in the Silesian region (as in the rest of Poland). At some places, this species congregates in great numbers in forest clearings and on fallow lands.

The species which threaten not only the native vegetation cover, but also human health (as they cause skin irritation and burns), include hogweed species of Caucasian origin, namely the giant hogweed *Heracleum mantegazzianum*, imported for decorative purposes, and Sosnowsky's hogweed *Heracleum sosnowskyi*, cultivated since the early 1970s in experimental farms as a fodder plant. These two species are often confused. In Poland, the greatest numbers of stations where these species occur, are recorded in the central (Małopolska) and southern (Podkarpacie) regions. In the Silesian province they are found in a number of locations, e.g. in the Beskid Śląski Mts.

The Silesian Voivodship is one of Poland's most affected environmental regions. Fragmentation of natural plant communities, changing in land use (a high proportion of arable land and built-up areas), regulating watercourses and development of communication system all favour the spread of alien plant species. The role of human activities is essential because people still cultivate alien species and introduce them to garden plots, parks and green areas in cities, plant them along street or accidentally drag the diaspores of many species (with goods, baggage, car tyres, etc.) which can establish in a new area if conditions are favourable.

Studies on plants of alien origin, an evaluation of their distribution ranges, ecology and impact on the native vegetation are necessary. Observations that are aimed at forecasting this phenomenon, and can estimate its scale and develop methods to control it, are of special importance. The propagation of issues related to biological invasion, are a separate, but all-important task. Many species of alien origin, already classified as invasive species, are still being planted, including large scale reclamation projects.

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